



Science, Technology, & More!

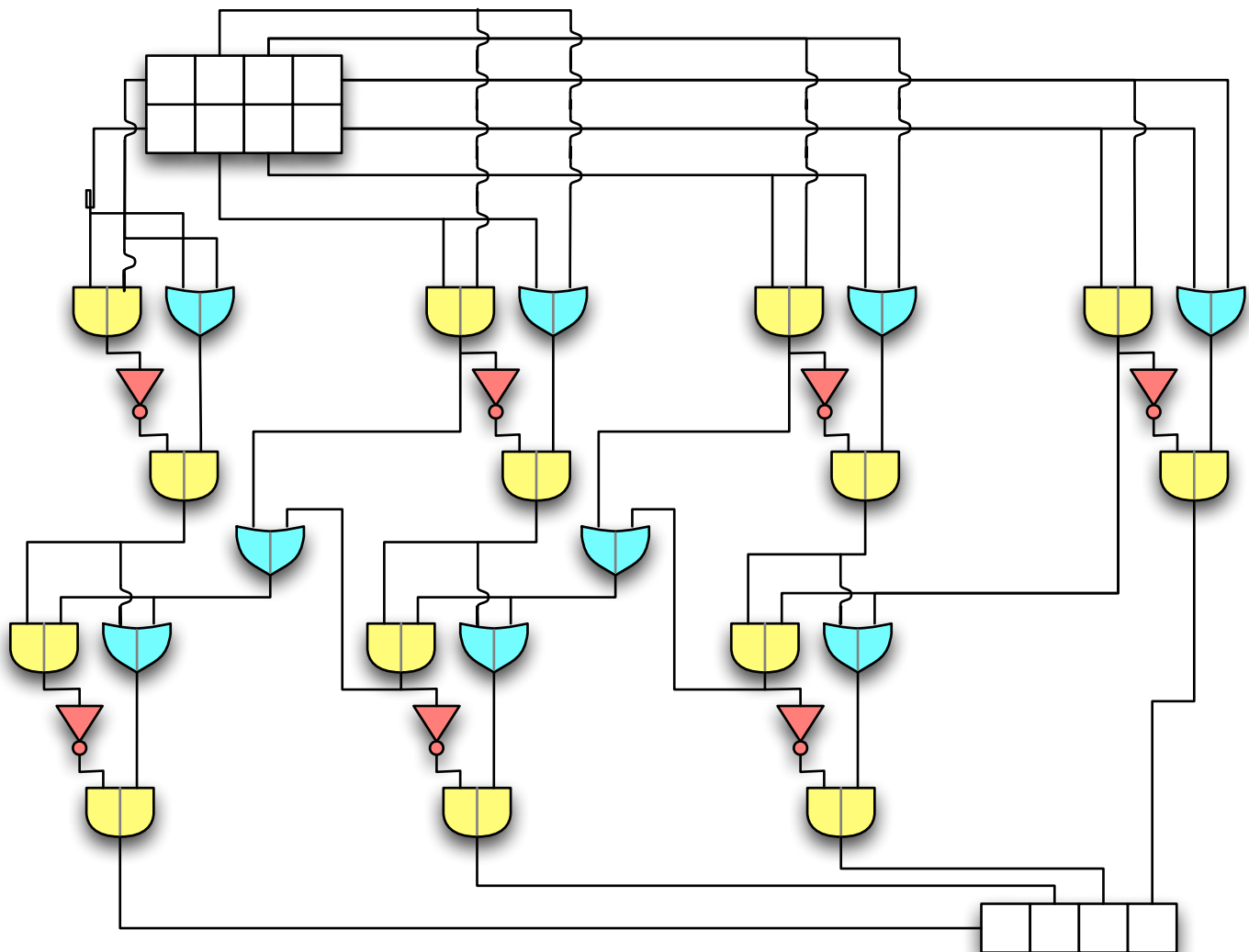


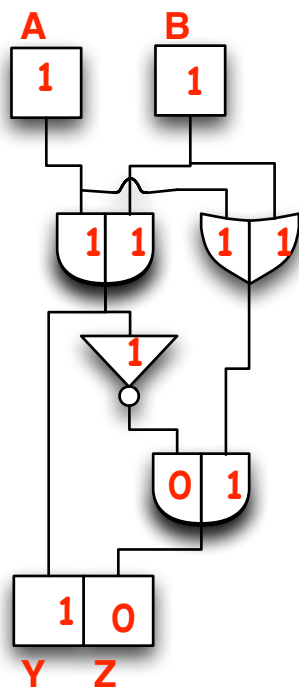
Processing Information

Adding Binary Digits

Assignment:

A particular set of logic gates can be used to add any two numbers in binary code. Choose two three-bit binary numbers and show how the logic gates process the input codes into an output code.





Truth Table

INPUTS		OUTPUTS	
A	B	Y	Z
0	0	0	0
0	1	0	1
1	0	0	1
1	1	1	0

Elwood the Electronic Watchdog

Elwood is a dog who has a very simple behavior. He barks whenever the doorbell rings. Also, he will bark if the phone rings provided that his human, Elmer, is snoring.

Let's design a circuit for Elwood. His input sensors (bits) are:

A value of 1 indicates (doorbell) ringing. A value of 0 indicates no ringing.

A value of 1 indicates (phone) ringing. A value of 0 indicates no ringing.

A value of 1 indicates snoring. A value of 0 indicates no snoring.

Draw the circuit which demonstrates Elwood's barking behavior.

<http://mathmaniacs.org/lessons/O4-boolean/Elwood.html>

Create a logic circuit that would allow an amusement park employee to determine whether a particular guest was permitted to ride the roller coaster.

Make three binary conditions, and write out the input conditions describing the values of 1 and 0.

Draw the circuit which determines which guests are permitted to ride on the coaster.

Assignment:

Since computers operate with electricity, their system is based on the number 2, and the only choices in each place is 0 or 1. It is called “binary”.

To convert binary numbers into decimal numbers, identify the place value of each 1 in the code, and add up the values. For example, the number 011001 has 1s in the 16, 8, and 1 place, so it is equal to 25 (16+8+1).

To convert decimal number into binary numbers, work from the left to the right. If you can add a 1 in that slot without exceeding your target number, do so. After you get to the 1s place, double check your answer by adding up the place values (as described above).

Complete the charts shown below!

Decimal Number		32s	16s	8s	4s	2s	1s
25	=	0	1	1	0	0	1
	=	1	1	0	1	0	0
	=	0	0	0	1	1	0
	=	1	0	1	0	1	0
	=	0	1	0	1	0	1
	=	1	0	0	0	1	1
	=	0	0	1	1	1	1
	=	0	0	0	1	0	0
	=	1	0	0	1	0	1
	=	1	1	0	0	0	0
	=						

Decimal Number		32s	16s	8s	4s	2s	1s
25	=						
1	=						
62	=						
33	=						
19	=						
7	=						
4	=						
43	=						
57	=						
37	=						
	=						

Further Challenge: Can you express the value 255 in binary code?